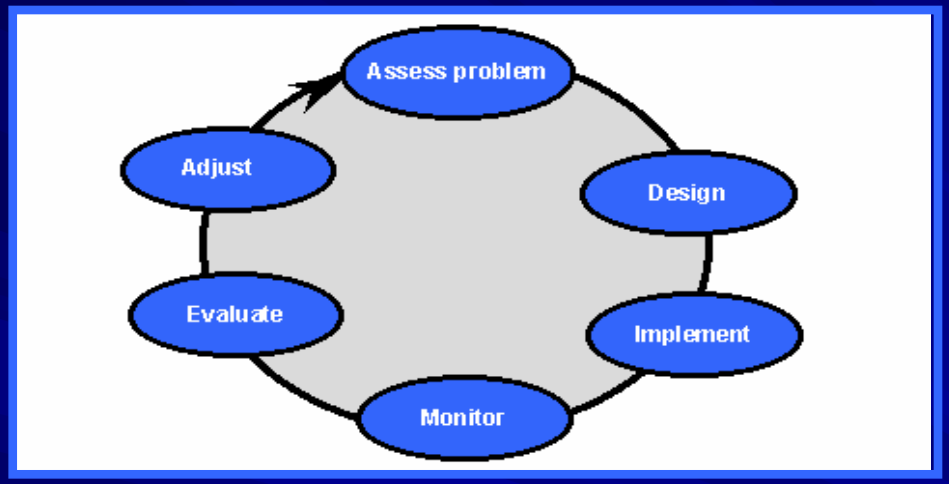
DOI Workshop on Adaptive Management



Case Study I: Species Management
Migratory Bird Management

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Adaptive Harvest Management

adaptive management of regulations governing the sport hunting of waterfowl

I. The decision problem

II. A conceptual framework
(elements, process, product)

III. AHM in practice
(science & management, institutional relationships)

IV. Ongoing challenges, take-home messages

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Adaptive Management has…

- **reduced contentiousness in rule-making**
  (using a transparent and inclusive process)
- **provided maximum hunting opportunity**
  (using a framework for incorporating best available science)
- **enhanced the prospects of sustainability**
  (using a framework for modifying future actions based on what is learned)

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Decision problem

- each year, establish federal hunting regulations in the 4 administrative flyways
  (i.e., max season length, max bag limit, outside dates)
- that provide sustainable harvesting opportunities for waterfowl

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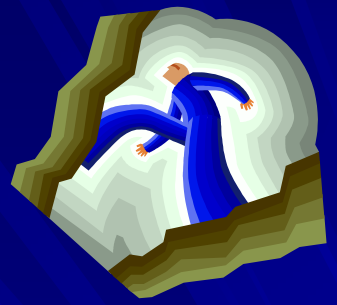
Decision problem

What makes regulatory decisions so difficult ?



- complex ecological system, subject to lots of environmental variation
- incomplete understanding of system dynamics
- imprecise regulatory controls
- imperfect ability to monitor system status & trajectory
- multiple (and sometimes conflicting) objectives

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Decision problem

What's at stake ?

- >50 million birds in spring
- 2 million hunters
- 13 million birds harvested/year
- $1.6 billion/yr economic output

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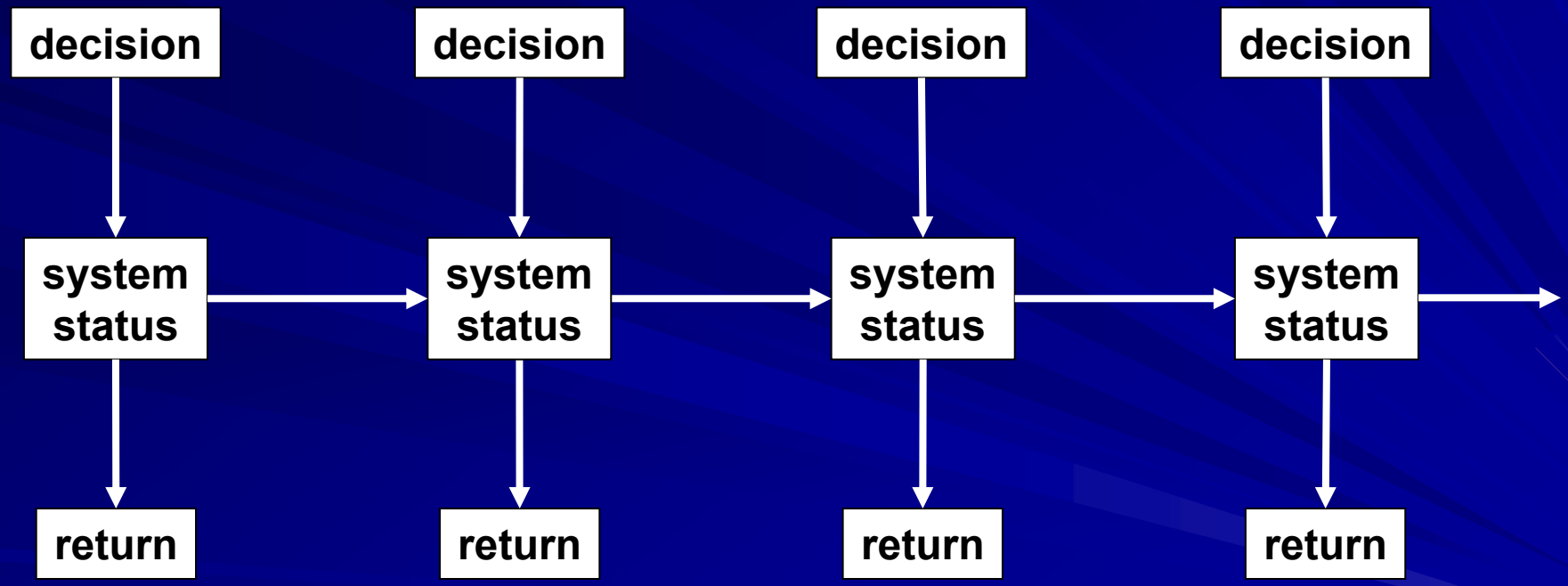
AM framework

Sequential decision making…



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AM framework

Identification of optimal decisions involves an interaction between:

- **a set of available management actions**
  (a subjective exercise)
- **predictions of management consequences**
  (an objective exercise)
- **a management objective**
  (a subjective exercise)

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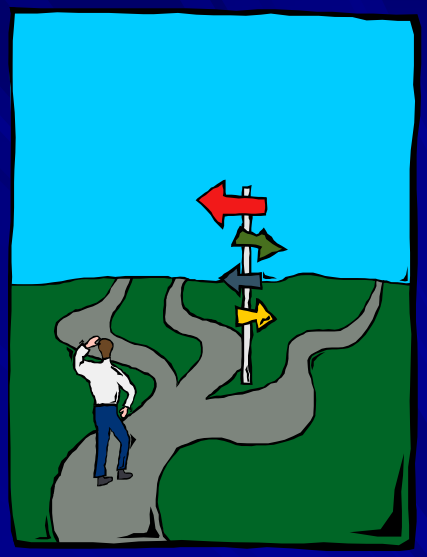
AM framework

Key ingredients…



- a management objective
  (e.g., max long-term cumulative harvest)
- a set of regulatory options
  (e.g., R, M, L)
- a set of alternative predictions (hypotheses)
  (e.g., harvest has substantial / negligible impact)
- measures of credibility for the alternative predictions
- a monitoring program for comparing predicted and observed system responses

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AM framework

Process…

1. each year, an *optimal* regulation is identified based on system status and on current measures of predictive credibility

2. system response is compared with the alternative predictions via the monitoring program

3. measures of credibility are updated

4. process is repeated

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AM framework

year 1

	PONDS				
POP	1.0	2.0	3.0	4.0	5.0
5.5	R	R	M	M	L
6.0	M	M	L	L	L
6.5	L	L	L	L	L
7.0	L	L	L	L	L
7.5	L	L	L	L	L
8.0	L	L	L	L	L
8.5	L	L	L	L	L

Product…

- Prescriptive regulatory strategy, given current resource conditions and understanding of system dynamics

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AM framework

year 1 → year 8

	PONDS				
POP	1.0	2.0	3.0	4.0	5.0
5.5	R	R	M	M	L
6.0	M	M	L	L	L
6.5	L	L	L	L	L
7.0	L	L	L	L	L
7.5	L	L	L	L	L
8.0	L	L	L	L	L
8.5	L	L	L	L	L

	PONDS				
POP	1.0	2.0	3.0	4.0	5.0
5.5	C	C	C	C	C
6.0	C	C	C	C	C
6.5	C	C	C	R	R
7.0	C	R	R	M	L
7.5	R	R	M	M	L
8.0	M	M	L	L	L
8.5	L	L	L	L	L

Product…

- Prescriptive regulatory strategy, given current resource conditions and understanding of system dynamics
- Updated strategies based on what is learned

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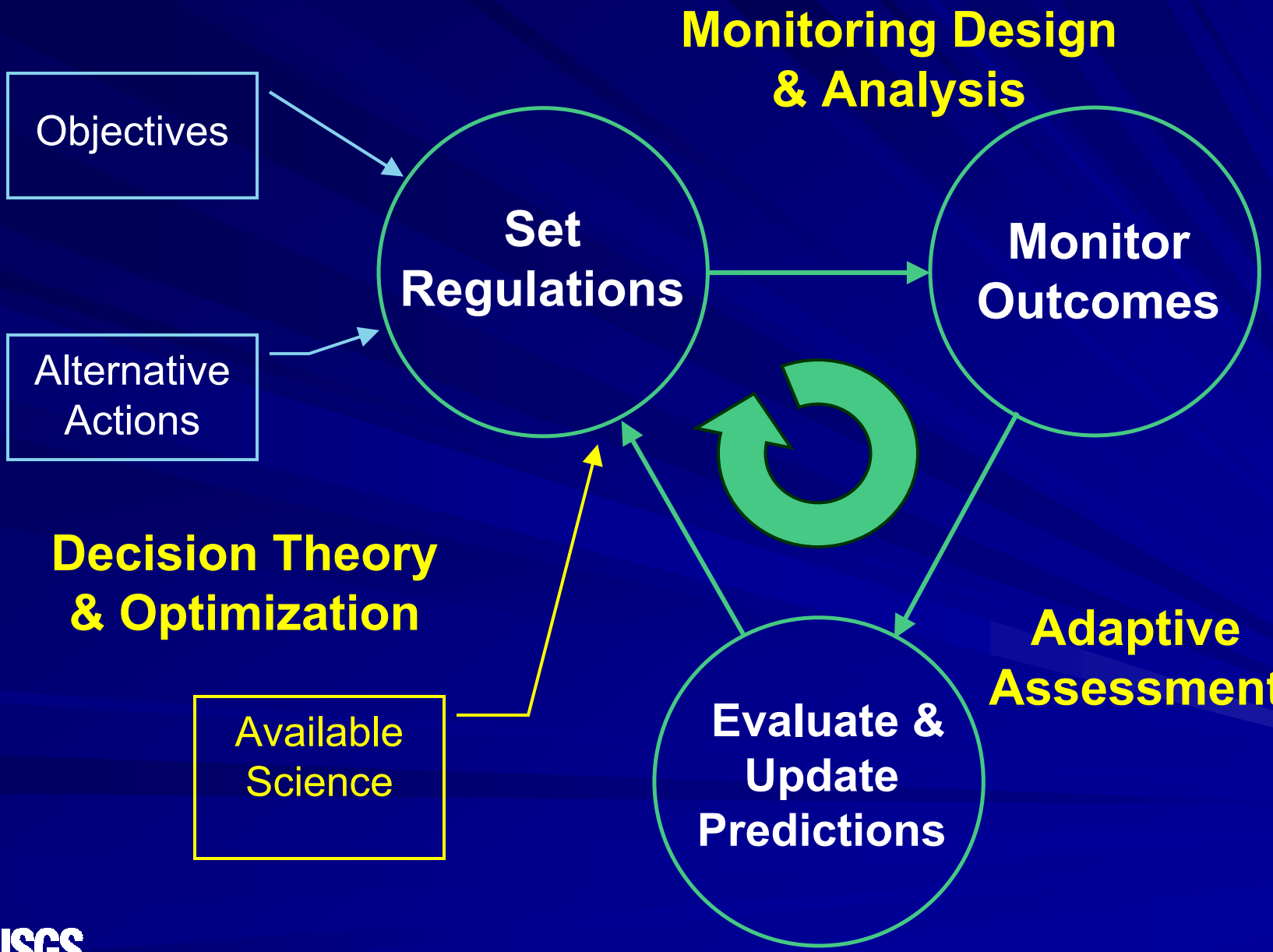
AM in practice



AM in practice

Technical assessment for policy issues…

Disagreement about system dynamics has been reduced by the process, so now…

- How does the set of management options affect the harvest policy and the expected outcomes?
- How does the specified objective affect the harvest policy and the expected outcomes?

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AM in practice

Technical assessment for policy issues…

- **Two competing objectives**
  - maximize sustainable harvest
  - maintain target population size
- **Balance affects regulations strategy**
  - target population size makes regulations more conservative
- **Open, transparent discussion**
  - stakeholder representatives participate proactively
  - discussion is motivated and informed by the application of science

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AM in practice

Existing institutional structure:

- included rigid roles and relationships
- relied on independent technical advisory groups
- lacked strategic focus
- lacked effective mechanisms for understanding & resolving conflict
- fostered an adversarial rather than collegial relationship

Service Regulations Committee

Atlantic Flyway Council

Miss. Flyway Council

Central Flyway Council

Pacific Flyway Council

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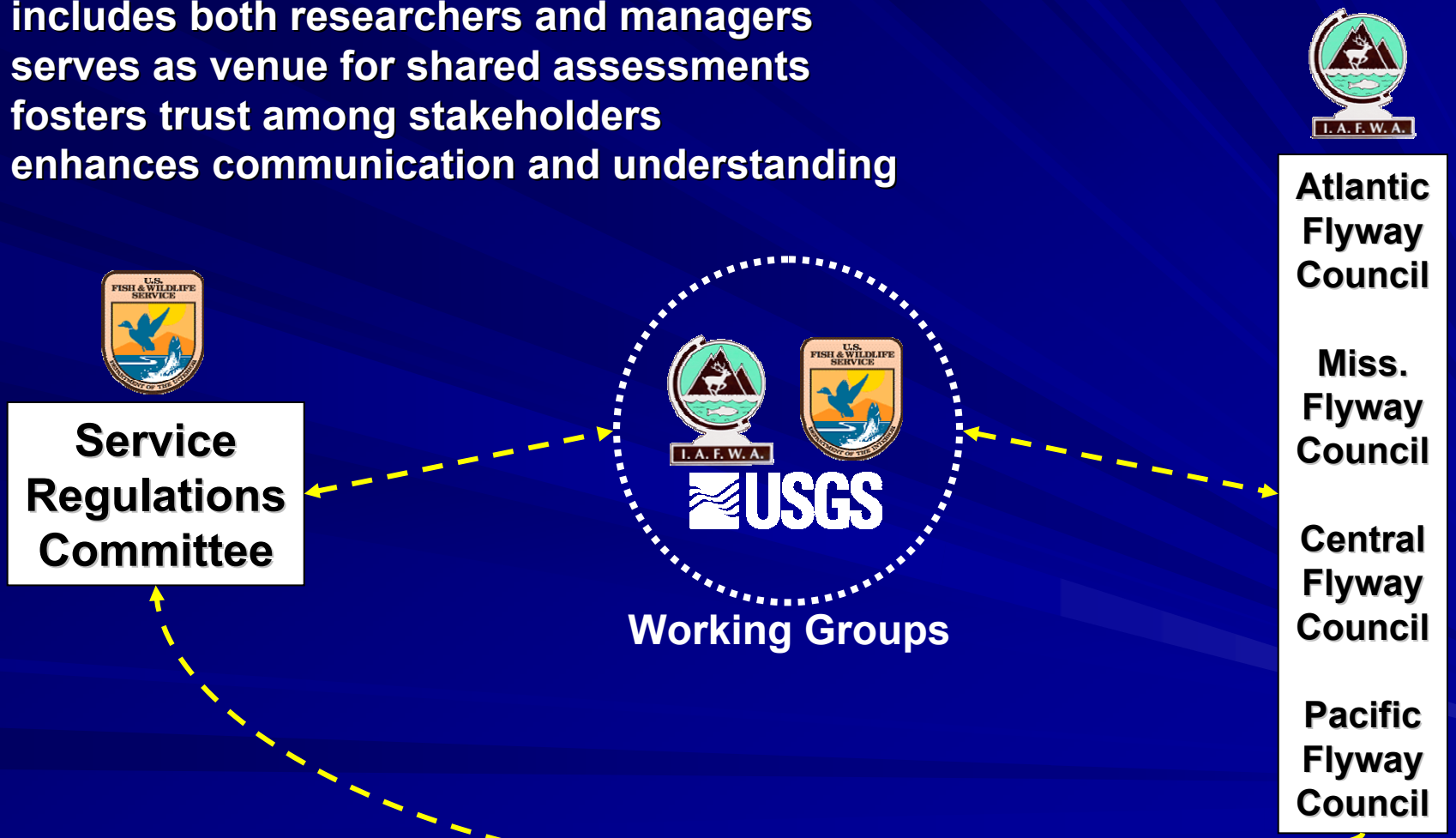
AM in practice

Modified structure:

- promotes strategic analysis, innovation, leadership
- includes both researchers and managers
- serves as venue for shared assessments
- fosters trust among stakeholders
- enhances communication and understanding



AM in practice

USFWS - USGS relations…

Technical work an informal collaboration between USFWS/DMBM and USGS/BRD:

- co-location and personal relationships a major factor in origin & maintenance of collaboration
- little money has ever changed hands

A strategic commitment to collaboration for improving for management performance:

- researchers need to think in terms of making management decisions
- managers needs to think in terms of learning from their decisions

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Ongoing challenges

Increased awareness that much of the difficulty in waterfowl management lies in setting objectives

- desire for expansion of AM application
- lack of awareness of the management limitations

Communication has not been a top priority

- our skill at assessments outstrips our ability to communicate the implications
- increasing gap between those that understand process & those that don't ("black box" syndrome)

Technical capacity has eroded

- net loss of positions
- net shift of positions from FWS to USGS
- institutional relationship between bureaus has changed

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Adaptive Harvest Management

as a formal decision structure…

- integrates science and policy
- copes explicitly with uncertainty

as an adaptive process…

- seeks, anticipates, and accommodates learning

as an institutional process…

- focuses technical assessment on key uncertainties, making predictions, optimization, monitoring results, updating predictions
- focuses political discussion on the management objectives and management alternatives

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